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UNITED STATES GENERAL ACCOUNTING OFFICE

WASHINGTON, D.C. 20548

HUMAN RESOURCES
DIVISION

April 15, 1982

B-207120

The Honorable Orrin G. Hatch
Chairman, Committee on Labor
and Human Resources
United States Senate



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Dear Mr. Chairman:

Subject: National Library of Medicine's Medical
Literature Analysis and Retrieval System
(HRD-82-66)

This report is in response to your September 30, 1981, request for information on the National Library of Medicine's (NLM's) provision of information products and services through its Medical Literature Analysis and Retrieval System (MEDLARS) and the related Index Medicus publications. Specifically, you requested that we provide the information by April 15, 1982, for use during the Committee's consideration of legislative action regarding NLM's recovery of costs through user charges.

OBJECTIVES, SCOPE, AND METHODOLOGY

As agreed with your office, the objectives of this review were to develop information, to the extent possible, on:

- The capital and other one-time costs, and the annual operating costs to the Government of providing information products and services through MEDLARS and through the Index Medicus publications.
- The percentage of costs recovered through user charges and sales of computer tapes and publications.
- The volume of use associated with each type of user, including the top 10 commercial users.
- The extent to which NLM's policy for recovering costs through user charges complies with relevant statutes and Office of Management and Budget (OMB) circulars.

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We reviewed pertinent NLM reports, regulations, and policies and interviewed officials at NLM Headquarters in Bethesda, Maryland. We analyzed cost recovery data related to NLM's user charges for MEDLARS services. We also obtained cost data from the Government Printing Office, which prints and sells Index Medicus publications for NLM. Because of the time constraints placed on this review, we did not perform an indepth audit to verify the accuracy of NLM's cost data. Rather, we used the fiscal year 1981 NLM operating expenditures as reported, and analyzed NLM's methodology for identifying and allocating costs associated with MEDLARS and the Index Medicus publications. The objective of this analysis was to ascertain the reasonableness and completeness of the methodology used by NLM. The responses to each of the questions you raised are discussed in enclosure I.

FEES NOT ADEQUATE TO RECOVER
ALL APPLICABLE COSTS

OMB Circular A-25 requires that Federal agencies recover the full costs of services provided except when (1) the recipient is engaging in a nonprofit activity for the public safety, health, or welfare or (2) the payment of full costs would not be in the best interest of the program. Since 1973, NLM has followed a user charge policy under which the Library recovers less than the full costs of its MEDLARS operation. NLM's current user charge policy, as approved by its Board of Regents in October 1981, requires that all users, regardless of type, pay the full costs of accessing the MEDLARS data bases. Costs associated with generating and maintaining the MEDLARS data bases are absorbed by NLM as part of its responsibility as a library.

According to NLM officials, the vast majority of users of the MEDLARS data bases have been excluded by NLM from the full cost recovery requirement because the public benefits from their use of MEDLARS. However, a number of users of the MEDLARS data bases are nonhealth professionals, such as attorneys and information brokers, whose use of MEDLARS may not be directly related to the public good. These users should be charged fees sufficient to recover full costs. NLM officials agreed but noted that these users represent less than 3 percent of MEDLARS users and are not always readily identifiable.

Based on the user charges in effect in fiscal year 1981, NLM recovered about 72 percent of the MEDLARS-related accessing costs and 44 percent of the total MEDLARS-related costs. In contrast, NLM would have recovered about 95 percent of its accessing costs and 58 percent of the total MEDLARS-related costs in 1981 had its current policy and user charges been in effect.

Need to revise cost computations

Overall, the methods used by NLM to identify and allocate costs to MEDLARS-related activities were reasonable. However, we noted that NLM's calculation for its fiscal year 1982 user charges for computer time and printed pages included the time and pages NLM staff used to maintain and update MEDLARS. In our opinion, the inclusion of the computer time and printed pages required to maintain and update MEDLARS understated the hourly and printed page costs and, ultimately, the charges imposed on users of the system.

RECOMMENDATIONS TO THE
DIRECTOR, NLM

We recommend that the Director, NLM:

- Assess charges which would recover the full costs of providing service to those users not directly involved in health-related activities.
- Recalculate the 1982 user charges by excluding the time and pages used by NLM to update and maintain MEDLARS.
- Establish procedures to account for the computer time and off-line printed pages NLM staff use to maintain and update MEDLARS for use in future calculations.

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As arranged with your office, we have limited distribution of this report to the Director, NLM, and the Secretary of Health and Human Services. Also, as requested by your office, we did not obtain written comments on this report. However, in discussing our draft report, NLM agreed with our recommendations to improve the Library's cost recovery activities. Unless you publicly announce the report's contents earlier, no further distribution will be made until 30 days from its issue date. At that time, we will send copies to interested parties and make copies available to others upon request.

Sincerely yours,



Gregory J. Ahart
Director

Enclosure

INFORMATION ON THE NATIONAL LIBRARY OF MEDICINE'S
MEDICAL LITERATURE ANALYSIS AND RETRIEVAL SYSTEM

BACKGROUND

Since its establishment in 1956, the National Library of Medicine (NLM) has served as the Nation's principal resource for the collection, organization, retrieval, and dissemination of scientific literature in the health and biomedical fields. In 1964, NLM established a computer-based bibliographic citation retrieval system known as MEDLARS--Medical Literature Analysis and Retrieval System. ^{1/} MEDLARS was established, for among other things, to improve NLM's publication of Index Medicus, a comprehensive monthly subject-author index to articles from about 2,600 biomedical journals.

In November 1971, NLM began providing, as a free service, an on-line bibliographic retrieval system as part of MEDLARS to enable universities, medical schools, hospitals, government agencies, and commercial organizations throughout the United States to rapidly retrieve information on journal article references from NLM's computer. Widespread acceptance of the on-line MEDLARS service prompted NLM to establish user charges for access to its data bases so that it could better control the use and growth of the on-line system. Consequently, in August 1973, NLM began charging users \$6 per connect-hour (the actual time a user is accessing MEDLARS data bases) and 10 cents for each off-line computer page printed.

NLM's user charges were increased in July 1975 to \$15 per connect-hour during prime-time hours (10:00 a.m. to 5:00 p.m. eastern standard time) and \$8 per connect-hour during non-prime hours. This increase was made so that NLM could fully recover its communication network costs and strengthen management controls over the Library's computer system. The 1975 connect-hour user charges remained in effect for most of the MEDLARS data bases until October 1981. NLM's user charges for the Chemline and Toxline data bases were revised several times during the 1975 to 1981 period to recover royalties assessed by the private organizations that compile them. The user charge for each computer page printed off-line was increased to 12 cents in January 1978 and to 15 cents in July 1980.

In October 1981, NLM increased its user charges to \$22 per prime-time connect-hour and \$15 per non-prime connect-hour. These user charges, still in effect as of April 1982, were set at these levels to (1) ensure equal access to on-line services and (2) recover

^{1/}Currently, MEDLARS consists of 17 specialized data bases-- Avline, Bioethics, Cancerlit, Cancerproj, Catline, Chemline, Clinprot, Epilepsy, Healthplan, Histline, Medline, Popline, Rtecs, Sdiline, Serline, TDB, and Toxline.

the full cost of accessing the data bases from users, including certain in-house costs, which, in the absence of MEDLARS, would not have been incurred by NLM.

CAPITAL COSTS FOR MEDLARS
AND INDEX MEDICUS

Since 1977, NLM has spent about \$3.2 million to purchase computers and related equipment to support MEDLARS and other computerized Library operations. Of this amount, no capital or other one-time costs could be identified exclusively with MEDLARS or the Index Medicus publications. NLM officials told us that the only capital costs associated with MEDLARS were part of the acquisition costs of the computers, related peripheral equipment, and the terminals used to access the computer. NLM officials also identified a portion of the construction costs of its Lister Hill Center Building where the MEDLARS operation is housed.

Based on fiscal year 1981 operating costs, MEDLARS activities account for about 32 percent of the total NLM computer operations. Using this percentage, we estimated that about \$1 million in computer and related acquisition costs are related to MEDLARS, as shown below.

Computer Equipment Acquisitions and
Estimated MEDLARS-Related Costs

<u>Date of acquisition</u>	<u>Type of equipment</u>	<u>Acquisition costs</u>	<u>Estimated MEDLARS-related costs</u>
		(000 omitted)	(000 omitted)
10/77	Central processing unit	\$1,582	\$ 506
10/77	Drum storage units	118	38
10/77	Disc storage units	213	68
10/77	Printer	49	16
10/77	Tapes	123	39
6/80	Disc storage units	296	95
6/80	Printer	203	65
8/80	Central processing unit (note a)	<u>613</u>	<u>196</u>
	Total	<u>\$3,197</u>	<u>\$1,023</u>

a/The central processing unit purchased in August 1980 replaced the unit purchased in October 1977. The unit was obtained from the National Institutes of Health.

As of September 30, 1981, NLM's equipment inventory included 439 terminals used to access the computer. Of these, 181 terminals are used exclusively or partially for MEDLARS activities. Using NLM's average cost per terminal of \$2,700 and staff estimates of the time the terminals are engaged in MEDLARS-related activities, we estimated that about \$214,000 of NLM's terminal acquisition costs are associated with MEDLARS, as shown below.

<u>Number of terminals</u>	<u>Acquisition costs</u>	<u>Percentage of time used on MEDLARS activities</u>	<u>Estimated MEDLARS- related costs</u>
64	\$172,800	10	\$ 17,280
2	5,400	32	1,728
48	129,600	43	55,728
29	78,300	50	39,150
2	5,400	60	3,240
<u>36</u>	<u>97,200</u>	100	<u>97,200</u>
<u>181</u>	<u>\$488,700</u>		<u>\$214,326</u>

Finally, NLM's Lister Hill Center Building cost about \$20 million. NLM officials estimated that about 7 percent of the building's 200,000 square feet of space is dedicated to MEDLARS activities. Therefore, about \$1.4 million of the building's construction cost is related to MEDLARS.

OPERATING COSTS FOR
MEDLARS AND INDEX MEDICUS

During fiscal year 1981, NLM's total in-house operating expenditures plus outside communications network expenditures and other services related to MEDLARS totaled \$48.9 million. Of the total, \$9.8 million was for MEDLARS, including the Index Medicus publications. These expenditures were incurred in connection with one of the following cost categories:

- Unique costs which are directly assignable to a specific product or service. These include personnel and telecommunication costs which would not be incurred if NLM did not offer these services publicly.
- Data creation costs which relate to producing the information contained in the various data bases and publications, including abstracting, indexing, and related activities.
- Tape costs which relate to the production, replication, and distribution of data base tapes.

--Publication costs which are for preparing, printing, and distributing printed materials. 1/

NLM costs associated with management, administration, and other overhead costs are allocated to each of the above cost categories. The table below shows the fiscal year 1981 NLM expenditures by cost category and by major MEDLARS data base.

MEDLARS Expenditures
by Major Data Base

<u>Type of cost</u>	<u>Medline</u>	<u>Catline</u>	<u>Chemline</u>	<u>Toxline</u>	<u>Others</u>	<u>Total</u>
----- (000 omitted) -----						
Unique Data	\$3,241	\$322	\$188	\$446	\$ 560	\$4,757
creation	918	93	232	302	1,605	3,150
Tape	25	2	5	34	7	73
Publication	<u>1,486</u>	<u>192</u>	<u>0</u>	<u>0</u>	<u>119</u>	<u>1,797</u>
Total	<u>\$5,670</u>	<u>\$609</u>	<u>\$425</u>	<u>\$782</u>	<u>\$2,291</u>	<u>\$9,777</u>

According to NLM officials, the publication costs for the Medline data base shown above are all related to the Index Medicus publications. Additional costs totaling about \$2 million were also incurred by the Government Printing Office, which prints and sells Index Medicus for NLM. Therefore, the total cost to the Government for producing the Index Medicus publications is about \$3.5 million.

PERCENTAGE OF NLM COSTS
RECOVERED THROUGH USER CHARGES
AND TAPE AND PUBLICATION SALES

Based on NLM's fiscal year 1981 user charges, we estimated that the total fees and value of services 2/ received by NLM for providing on-line MEDLARS was about \$3.5 million, or 44 percent of total MEDLARS costs, excluding publication costs. Of the \$3.5 million, domestic and foreign users accounted for about \$3.3 million. The remaining \$184,000 represents the value we assigned to the services NLM received from MEDLARS in carrying out its basic library activities. As shown in the following table, during fiscal

1/MEDLARS publications include Index Medicus, NLM Current Catalogue, NLM Audiovisual Catalogue, and Health Sciences Serials.

2/NLM provides MEDLARS data base tapes or on-line access to foreign countries in exchange for an equal amount of indexing, abstracting, and other services.

year 1981, NLM recovered about 72 percent of its accessing and tape costs associated with providing on-line access to the MEDLARS data bases.

Comparison of MEDLARS Fiscal Year 1981 Operating Costs
With Value Received for MEDLARS Use

	<u>Medline</u>	<u>Catline</u>	<u>Chemline</u>	<u>Toxline</u>	<u>Other</u>	<u>Total</u>
----- (000 omitted) -----						
Operating costs:						
Accessing	\$3,241	\$322	\$188	\$446	\$ 560	\$4,757
Tape	<u>25</u>	<u>2</u>	<u>5</u>	<u>34</u>	<u>7</u>	<u>73</u>
Subtotal	3,266	324	193	480	567	4,830
Data creation	<u>918</u>	<u>93</u>	<u>232</u>	<u>302</u>	<u>1,605</u>	<u>3,150</u>
Total	<u>\$4,184</u>	<u>\$417</u>	<u>\$425</u>	<u>\$782</u>	<u>\$2,172</u>	<u>\$7,980</u>
Value received:						
Domestic	\$1,871	\$ 94	\$ 81	\$405	\$ 279	\$2,730
Foreign	423	5	10	70	64	572
NLM	<u>42</u>	<u>13</u>	<u>53</u>	<u>53</u>	<u>23</u>	<u>184</u>
Total	<u>\$2,336</u>	<u>\$112</u>	<u>\$144</u>	<u>\$528</u>	<u>\$ 366</u>	<u>\$3,486</u>
Percent of accessing and tape costs recovered	72	35	75	110	65	72
Percent of total costs recovered	56	27	34	68	17	44

The value received data shown above are based on NLM's user charges which were in effect before October 1981. As shown on the next page, if NLM's current user charges were in effect during fiscal year 1981, NLM would have recovered about 95 percent of its accessing and tape costs and about 58 percent of its total MEDLARS costs, excluding publication costs.

Comparison of MEDLARS 1981 Operating Costs
with Value Received for MEDLARS Use
Based on Fiscal Year 1982 User Charges

	<u>Medline</u>	<u>Catline</u>	<u>Chemline</u>	<u>Toxline</u>	<u>Other</u>	<u>Total</u>
	----- (000 omitted) -----					
Operating costs:						
Accessing	\$3,241	\$322	\$188	\$446	\$ 560	\$4,757
Tape	25	2	5	34	7	73
Subtotal	3,266	324	193	480	567	4,830
Data creation	918	93	232	302	1,605	3,150
Total	<u>\$4,184</u>	<u>\$417</u>	<u>\$425</u>	<u>\$782</u>	<u>\$2,172</u>	<u>\$7,980</u>
Value received:						
Domestic	\$2,519	\$148	\$139	\$461	\$ 393	\$3,660
Foreign	502	7	15	77	71	672
NLM	59	19	89	65	31	263
Total	<u>\$3,080</u>	<u>\$174</u>	<u>\$243</u>	<u>\$603</u>	<u>\$ 495</u>	<u>\$4,595</u>
Percent of accessing and tape costs recovered	94	54	126	126	87	95
Percent of total costs recovered	74	42	57	77	23	58

According to Government Printing Office officials, sales revenue for Index Medicus publications was about \$1.8 million in fiscal year 1981. This represents about 50 percent of the total costs the Government incurred during that year for producing these publications.

NLM's calculations to determine
charges need improvement

NLM's current connect-hour user charges are based on cost and use projections derived from fiscal year 1980 MEDLARS operating costs and system use. Using these projections, NLM calculated an average connect-hour cost to establish the prime and non-prime connect-hour user rates. According to NLM officials, the current \$22 and \$15 connect-hour user charges represent the optimal combination of charges which would provide a sufficient amount of revenue and exchange services to equal the estimated cost of accessing MEDLARS.

We noted that NLM's calculation of the average connect-hour cost was based on the total number of hours MEDLARS is in operation. Our analysis showed that about 17,000 of the 163,000 hours MEDLARS was in operation during fiscal year 1981 were used by NLM staff to maintain and update the system. Including these hours in the calculation lowers the average connect-hour cost and, ultimately, the connect-hour charges to system users. For example, using the fiscal year 1981 MEDLARS on-line accessing costs of about \$3.2 million, 1/ the average connect-hour costs using total hours would be \$19.70. If the 17,000 hours used by NLM were not included in the calculation, the average connect-hour cost would be \$22.04. We believe that the time NLM staff access the MEDLARS data bases to keep them current, accurate, and operational should be reflected in the user charges.

A similar problem exists with NLM's calculation of user charges for off-line pages which is based on average cost per page. NLM staff received about 750,000 off-line pages in fiscal year 1981, an undetermined number to update and maintain MEDLARS and the remainder for library purposes. The pages used for MEDLARS upkeep were included in NLM's computation of average cost per page. This ultimately lowered the user charge for off-line printed pages.

DOMESTIC USER VOLUME AND THE
TOP 10 COMMERCIAL USERS
OF MEDLARS

During fiscal year 1981 domestic users of MEDLARS used the system for about 130,000 hours and accounted for about 5.9 million pages of the off-line pages printed during this period. The following table shows the use of MEDLARS by type of domestic user and the amount NLM billed each user.

1/Total MEDLARS accessing costs of about \$4.8 million less estimated off-line page costs of \$1.6 million.

Domestic Use of MEDLARS by Connect-Hours,
Off-line Pages, and Dollars Billed in Fiscal Year 1981

Type of user	Number of connect hours		Off-line pages		Billings	
	Number	Percent	Number	Percent	Amount	Percent
			(000 omitted)		(000 omitted)	
Hospital/clinics	54,850	42.2	1,151	19.5	\$ 832	31.7
Medical schools	28,241	21.7	1,598	27.0	596	22.7
Commercial firms	18,120	13.9	1,539	26.1	575	21.9
Government/research	13,223	10.2	950	16.1	381	14.5
Allied health	4,897	3.8	182	3.1	89	3.4
Other libraries	3,755	2.9	215	3.6	21	0.8
Foundations	3,102	2.4	75	1.2	50	1.9
Universities	1,796	1.4	111	1.9	42	1.6
Information agencies	816	0.6	51	0.9	18	0.7
Educational	327	0.2	4	0.1	5	0.2
Other	979	0.7	29	0.5	16	0.6
Total	<u>130,106</u>	<u>100.0</u>	<u>5,905</u>	<u>100.0</u>	<u>\$2,625</u>	<u>100.0</u>

The following are the 10 domestic commercial firms that used MEDLARS the most during the 11-month period January 1981 through November 1981.

<u>Domestic user</u>	<u>Number of connect-hours used</u>
Merck, Sharp and Dohme	3,544.5
Upjohn Co.	1,246.6
Tracor Jitco	370.1
Pfizer Central	343.0
Eastman Kodak	287.6
SRI International	263.4
Sandoz Pharmaceutical	260.4
E. I. Dupont DeNemours	256.3
Burroughs-Wellcome Co.	250.9
Bristol Labs	243.3
Total	<u>7,066.1</u>

According to NLM officials, these domestic firms use the MEDLARS data bases for health research, education, and patient care.

NLM AUTHORITY AND POLICY
FOR COST RECOVERY FOR
MEDLARS ON-LINE SERVICE

With one exception, NLM's pricing policy with regard to cost recovery is in compliance with relevant statutes and OMB Circular A-25.

Section 382(a) of the Public Health Service Act, Part I (42 U.S.C. 276 et seq.) authorizes the Secretary, Department of Health and Human Services, through the Library, to

"* * * (1) acquire and preserve books, periodicals, prints, recordings, and other library materials pertinent to medicine; (2) organize the materials specified in clause (1) of this subsection by appropriate cataloging, indexing, and bibliographical listing; (3) publish and make available the catalogues, indexes and bibliographies referred to in clause (2) of this subsection; (4) make available through loans, photographic or other copying procedures or otherwise, such materials in the Library as he deems appropriate; (5) provide reference and research assistance; and (6) engage in such other activities in furtherance of the purposes of this part as he deems appropriate and the Library's resources permit. * * *"

The Act further authorizes the Secretary, with the advice and recommendations of NLM's Board of Regents, 1/ to provide copies of the publications or materials, and make available its facilities, bibliographic, reference, or other services to public and private agencies and organizations, institutions, and individuals. The Secretary is authorized to make these publications, materials, facilities, and services available (1) without charge as a public service, or (2) upon a loan, an exchange, or a charge basis, or (3) in appropriate circumstances, under contract arrangements made with a public or other nonprofit agency, organization, or institution.

1/An advisory body established under Public Law 84-941 to advise, consult with, and make recommendations to the Secretary on important matters of policy in regard to NLM, including the rules under which its materials, publications, facilities, and services shall be made available to users.

Pursuant to the Act, NLM developed a pricing policy based on its belief that the user community should (1) share the cost of providing on-line access to NLM's data bases, (2) be assessed fair and reasonable prices, and (3) have equal access to NLM services at equal prices. Sharing the costs of providing on-line access to the data bases is accomplished, in NLM's view, by having the users pay the costs of accessing the MEDLARS data bases and NLM absorb the costs of creating and housing the data bases.

OMB Circular A-25 provides general guidance for establishing user charges for recipients of Government services. The Circular states that where a Government service provides special benefits to an identifiable recipient above and beyond those which accrue to the public at large, a charge should be imposed to recover the full cost to the Federal Government of rendering that service. The Circular further states that no charge should be made for services when the identification of the ultimate beneficiary is obscure and the service can be primarily considered as benefiting broadly the general public. Finally, the Circular provides for certain exceptions to full cost recovery in circumstances where (1) the recipient is engaged in a nonprofit activity designed for the public safety, health, or welfare and (2) payment of the full fee by a State, local government, or nonprofit group would not be in the interest of the program.

According to NLM officials, the vast majority of MEDLARS users fall under these exceptions and, therefore, have been excluded by NLM from the full cost recovery requirement on the basis that the ultimate beneficiary of their use of MEDLARS is the general public. However, NLM officials recognize that certain non-health-related users of the MEDLARS data bases, such as attorneys and information brokers, are involved in activities that are not directly related to public safety, health, or welfare. These users represent less than 3 percent of MEDLARS users and, according to NLM officials, are not always readily identifiable. In our opinion, and NLM officials agree, such users should be required to pay the full costs of MEDLARS services they receive as required by OMB Circular A-25.

With the one exception noted above, NLM's pricing policy for establishing user charges to recover those costs associated with accessing the MEDLARS data bases appears consistent with existing statutes and regulations. In addition, the methods NLM used to identify MEDLARS-related costs and determine its user charges seem reasonable. However, if NLM is to achieve full recovery of its accessing costs, we believe those connect hours and off-line pages used by NLM staff to update and/or maintain MEDLARS should not be included in NLM's calculation of average connect-hour and off-line page costs.

RECOMMENDATIONS TO THE DIRECTOR, NLM

We recommend that the Director, NLM:

- Assess charges which would recover the full costs of providing service to those users not directly involved in health-related activities.
- Recalculate the 1982 user charges by excluding the time and pages used by NLM to update and maintain MEDLARS.
- Establish procedures to account for the computer time and off-line printed pages NLM staff use to maintain and update MEDLARS for use in future calculations.